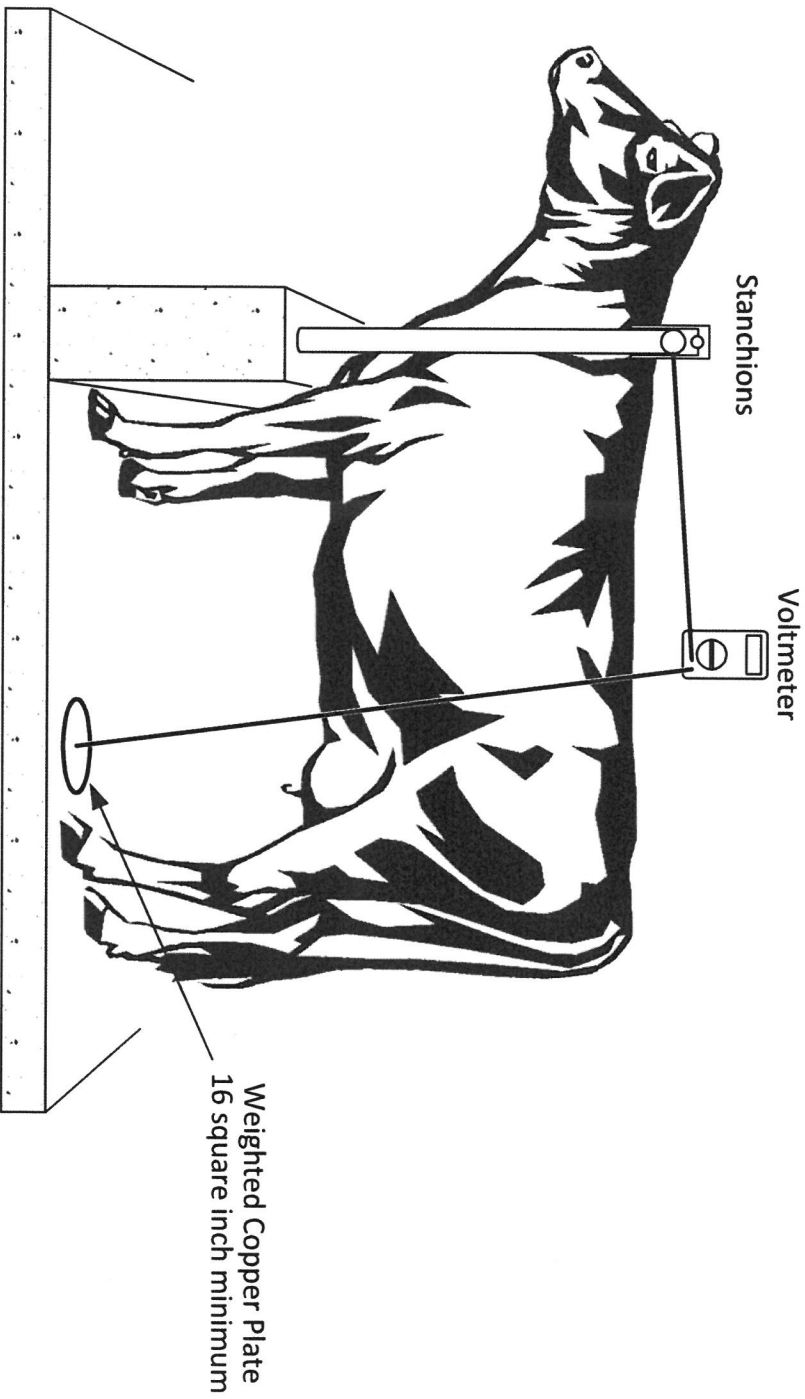
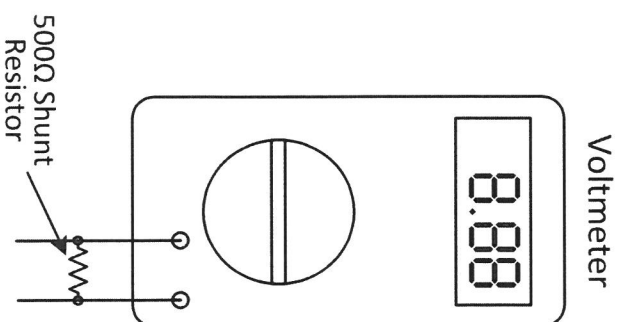
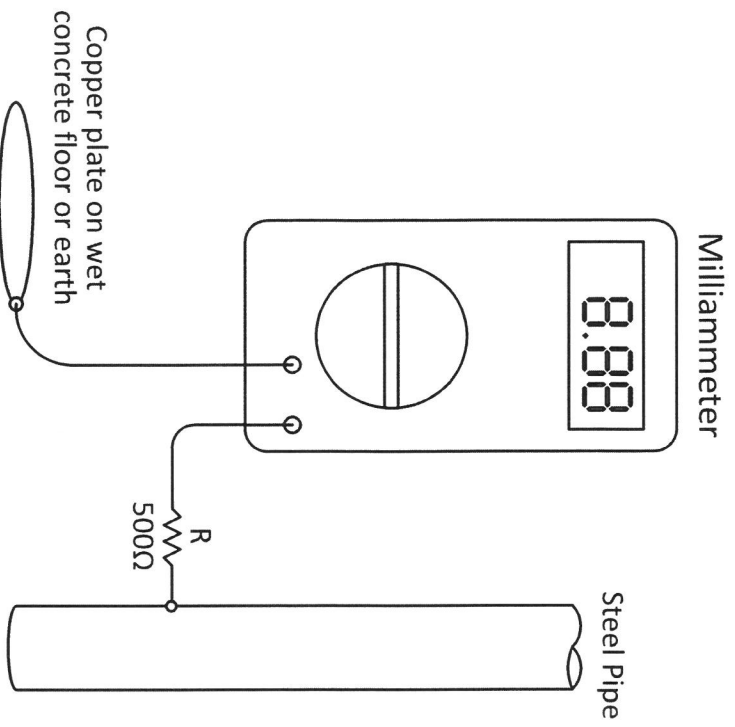
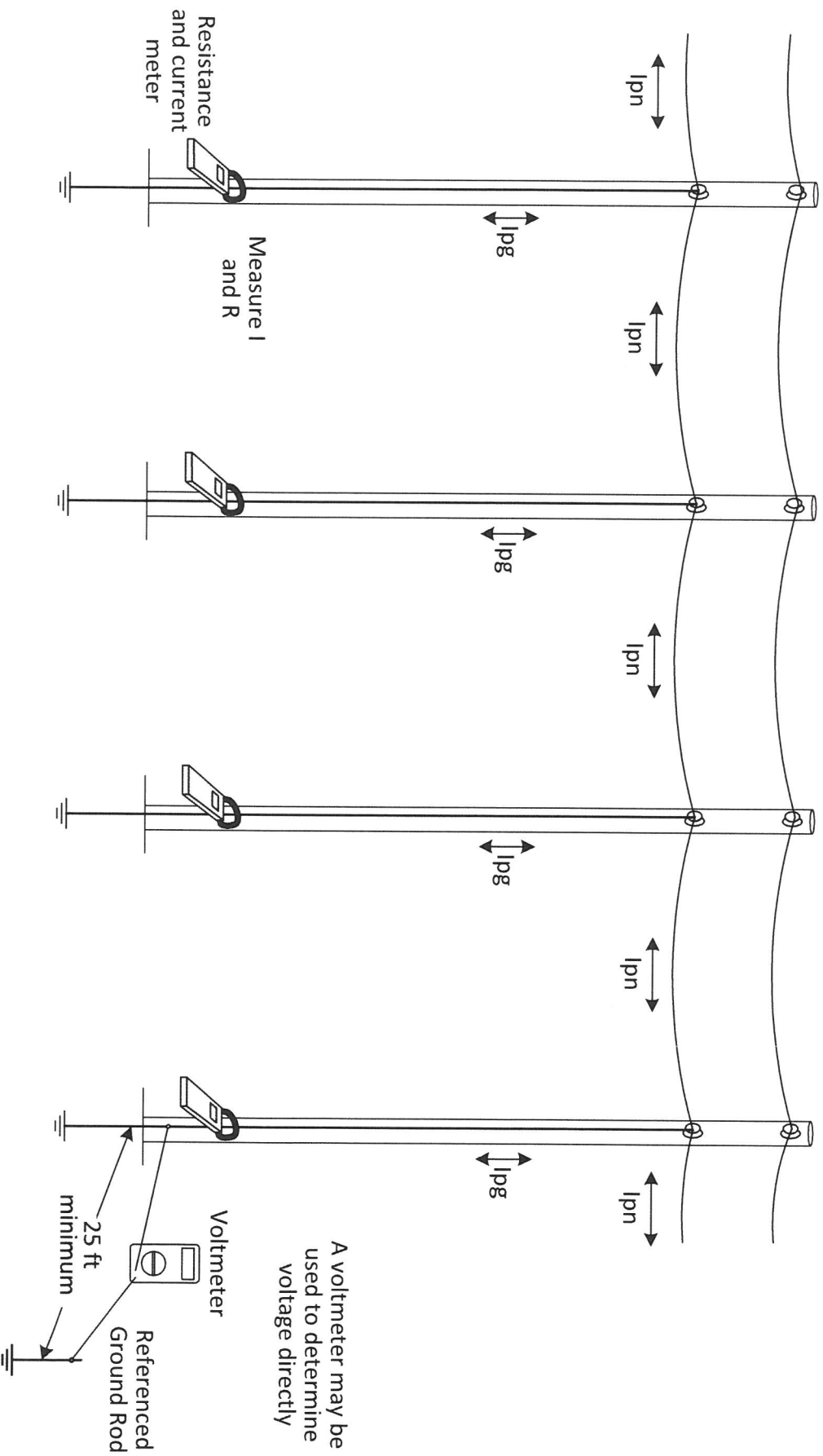
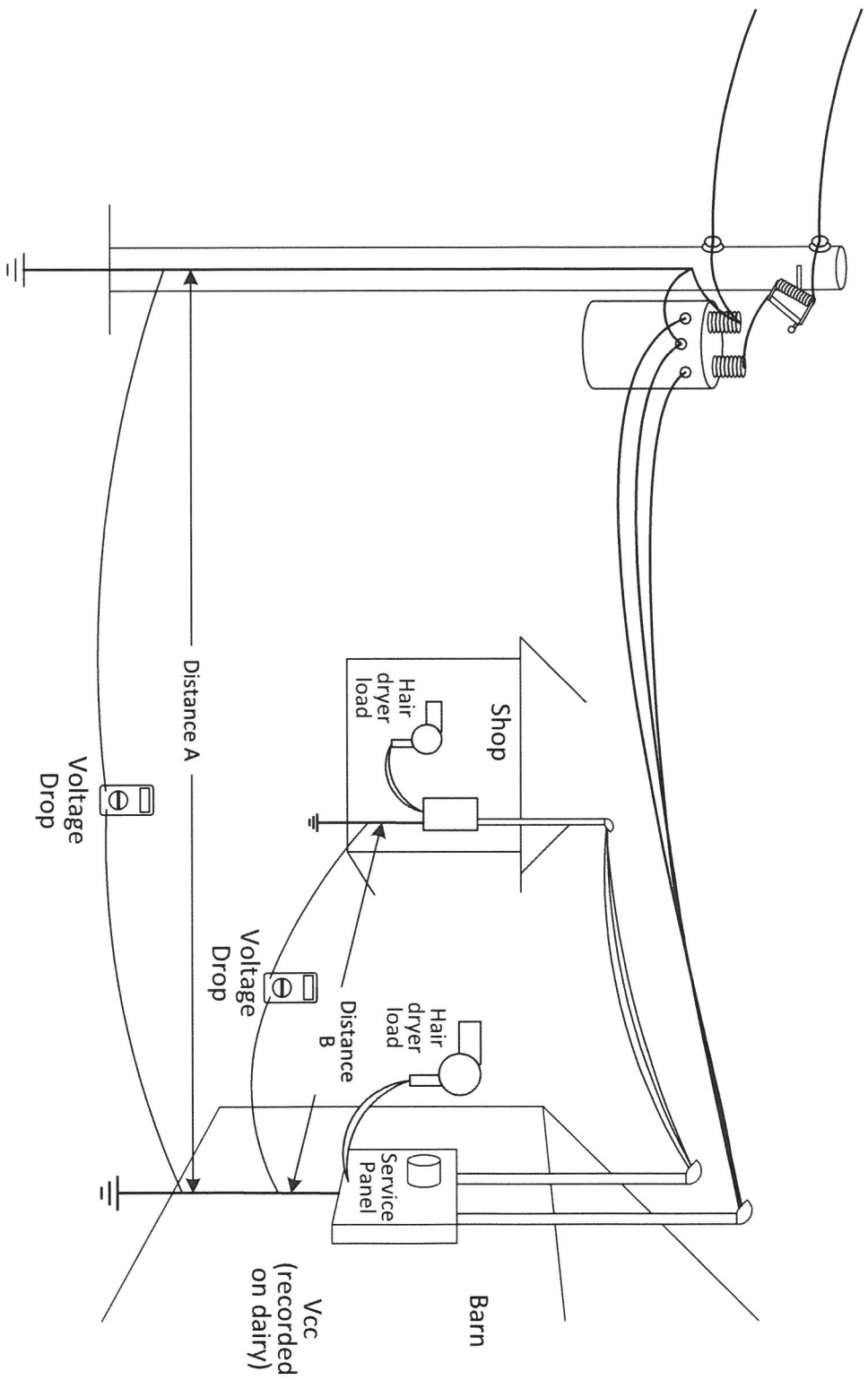


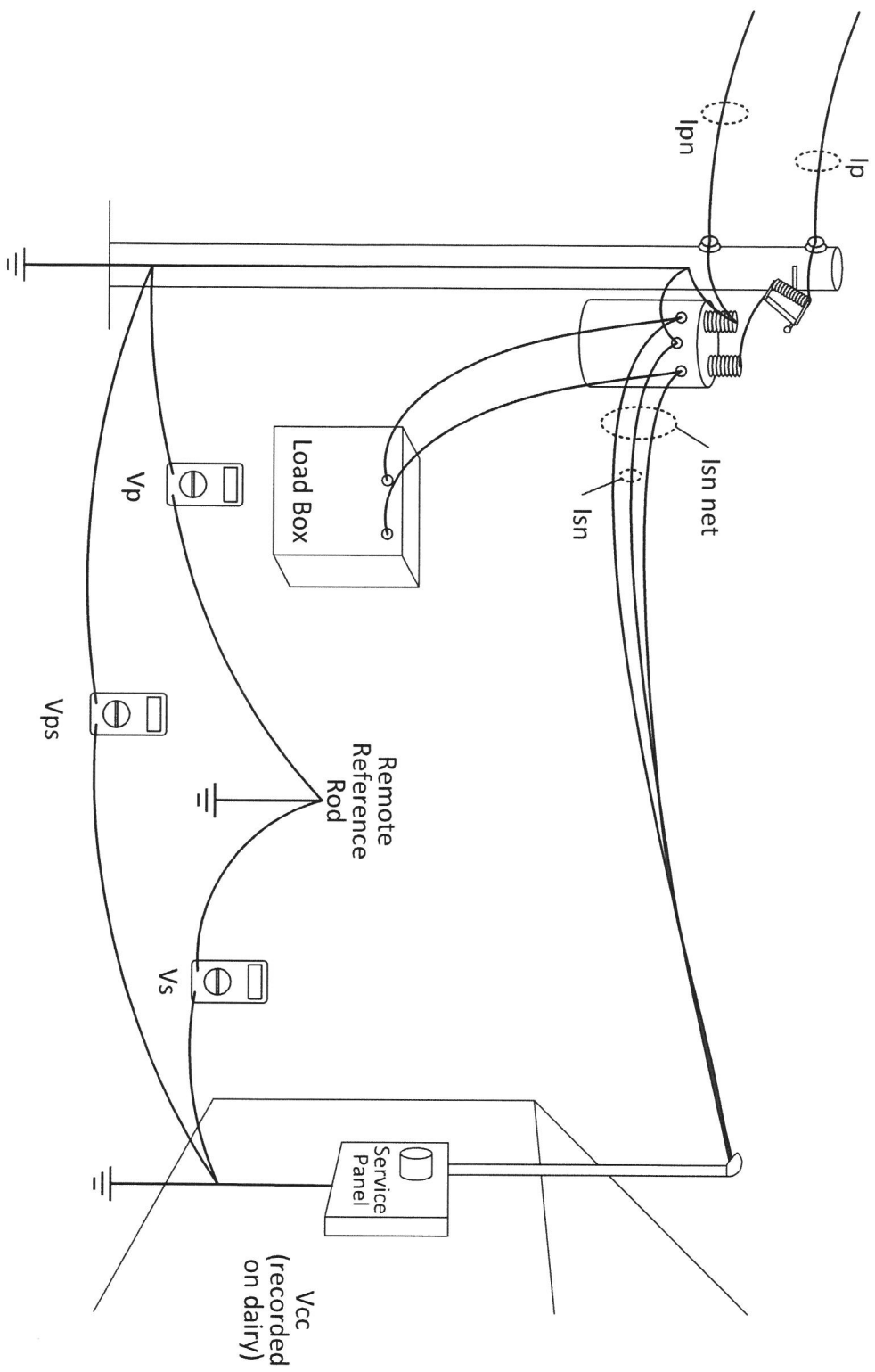
Voltage from stanchion to floor











the tests, and an analysis of the data or results obtained from the tests. If remediation was required under these rules, the report shall specify the actions taken or to be taken. The utility shall provide a copy of the written report to the dairy producer. (3-31-22)

083. -- 090. (RESERVED)

REMEDIAL ACTIONS AND COMMISSION PROCEEDINGS
Rules 91 through 92

091. REMEDIATION (RULE 91).

01. Utility System. If the utility is required to conduct remediation, it shall commence such remediation within five (5) business days. The utility shall diligently pursue to completion remedial procedures which shall reduce, and are reasonably likely to sustain, that portion of the stray current or voltage attributable to the utility's distribution system to a level equal to or less than fifty percent (50%) of the preventive action level (PAL). This may include addressing other off-dairy sources. (3-31-22)

02. Other Dairies, Farms and Industrial Sites. If a utility's contribution to stray voltage exceeds fifty percent (50%) of the preventive action level (PAL) and the utility determines that another customer is a significant contributing source of stray voltage, the utility shall notify both the dairy and the other customer in writing. (3-31-22)

092. COMMISSION PROCEEDINGS (RULE 92).

01. Filing with the Commission. All petitions seeking relief under Section 61-805, Idaho Code, shall be filed with the Commission Secretary pursuant to Section 005. Petitions shall conform to IDAPA 31.01.01, "Rules of Procedure of the Idaho Public Utilities Commission," Section 053. The petitioner shall file an original and five (5) copies of the petition. (3-31-22)

02. Contents of Petition. The petition shall conform to IDAPA 31.01.01, "Rules of Procedure of the Idaho Public Utilities Commission," Section 053. The petition shall contain background information, the date the notice was filed with the serving utility, a description of the alleged incident(s) of non-compliance with the Stray Current and Voltage Remediation Act, and the remediation actions (if any) undertaken by either the utility or the dairy. A copy of the utility's entire stray voltage report shall accompany the petition. (3-31-22)

093. -- 999. (RESERVED)

APPENDIX 1
TEST 1 – COW CONTACT POINT DATA FORM

Dairy Name:

Date:

Dairy Location:

Shunt Resistor:

ohm (Rshunt)

Item #	Contact Point Identifier	Contact Point Description	Voltage Measured w/o Shunt Resistor Voc	Voltage Current Measured w/Shunt Resistor Vcc	Source Resistance Calculated Rsource	Comments
1						
2						

TEST 1 – COW CONTACT POINT DATA FORM INSTRUCTIONS

1. The total information provided by the contact point identification, the contact point description, and the dairy sketch(es) shall be sufficient to allow a third party to accurately repeat the test locating the correct cow contact points for a specific contact voltage.
2. The voltages measured in this test shall be determined using the same instrument(s) for both data points. One reading shall be taken immediately following the other using the same meter.
3. The actual source resistance is calculated from the known shunt resistance and the measured voltage.
4. Record comments as appropriate or necessary.

$$R_{\text{source}} = \frac{V_{\text{oc}} - V_{\text{shunt}}}{V_{\text{shunt}}} \times R_{\text{shunt}}$$

or

$$R_{\text{source}} = \frac{V_{\text{oc}}}{I_{\text{shunt}}} - R_{\text{shunt}}$$

APPENDIX 2

TEST 2 – “48-HOUR” TEST REPORT FORM 1

Customer Name:

Date:

Start Time:

Stop Time:

Contact Point Identifier Number

Hour	Time of Occurrence (Hr, Min) of Highest Steady State Vcc or Icc	Voltage Across (Current Thru) Rshunt Vcc or Icc	Primary Neutral to Referenced Ground Vp	Secondary Neutral to Reference Ground Vs	Primary to Secondary Voltage Drop Vps	Duration Steady State Vcc or Icc Exceeded PAL in One Hour Period
1						
2						

**TEST 2 - “48-HOUR” TEST REPORT FORM 1
INSTRUCTIONS**

Record the following data with a long term digitizing data recorder or its equivalent for a minimum of 48 hours as specified in Rule 074:

- a. Voltage from primary neutral to remote reference ground, Vp, at transformer.
- b. Secondary neutral to remote reference ground voltage, Vs, at the electrical panel serving the area

for the Vcc or Icc selected.

- c. Primary neutral to secondary neutral voltage, Vps, between points of connection for Vp and Vs.
- d. Steady state cow contact voltage or current at the preselected point(s) with the highest cow contact voltage or current recorded in Test 1, Vcc or Icc.

Steady State Data:

Steady state data recorded during the 48-hour test shall be presented in tabular format on Form 1 as described below, or it shall be presented graphically. Graphical presentation shall include a time scale for the entire recording period and a clear indication of the steady state readings of Vcc or Icc, Vp, Vs and Vps for the recording intervals. The scale(s) shall be such that steady state cow contact voltages or currents at or above the PAL are easily identifiable.

If using tabular format, the analyst shall enter data in the table for each hour of the 48 hours of the test in chronological order. The data recorded in the table shall include: the specific time that the highest steady state value of Vcc or Icc was recorded in that hour; all four corresponding data points recorded at that time (Vp, Vs, Vps and Vcc or Icc), and the total time during the hour that the steady state Vcc or Icc exceeded the PAL.

TEST 2 – REPORT FORM 2
SUPPLEMENTAL DATA FOR FARM OWNER
TRANSIENT DEVIATIONS FOUND DURING “48-HOUR” TEST

Customer Name: _____ Date: _____
Start Time: _____ Stop Time: _____
Contact Point Identifier Number: _____

Hour	Time of Highest Peak Vcc (Icc)	Highest Voltage Recorded	Total Number Transient Deviations	No. Transient Deviations Exceeding 1.0 Volts with Peak Magnitude Greater than 1.0 Volts (2.0 milliamps)
1				
2				

Transient deviations occur due to electrical events such as motor starts. The PAL level is 1.0 volt for steady state voltages but PAL does not apply to transient voltage deviations.

TEST 2 - “48-HOUR” TEST REPORT FORM 2
INSTRUCTIONS

Recording Transient Data:

For the purpose of identifying and reporting transient deviations, a transient deviation occurs when the recorded maximum Vcc or Icc in a recording interval exceeds two hundred percent (200%) of the steady state Vcc or Icc recording during the same recording interval.

Transient data recorded during the 48-hour test shall be presented in tabular format on the "48-hour Test – Transient Deviation Data" form as described below, or it shall be presented graphically. Graphical presentation shall include a time scale for the entire recording period and a clear indication of the maximum Vcc or Icc recorded for the recording intervals. The scale(s) shall be such that Vcc transient deviations at or above two (2.0) volts, or Icc transient deviations at or above four (4) milliamps, are easily identifiable.

If using a tabular format, the analyst shall enter data in the table for each hour of the 48 hours of the test in chronological order. The data recorded in the table shall include: the specific time during the hour that the transient deviation in Vcc or Icc with the largest peak magnitude occurred, the corresponding peak Vcc or Icc, the total number of transient deviations recorded in that hour, and the total number of transient deviations recorded in that hour with a peak magnitude of two (2) or more volts for Vcc or four (4) or more milliamps for Icc.

APPENDIX 3

TEST 3 – PRIMARY PROFILE DATA FORM

Dairy Name:

Dairy Location:

Date:

Item	Pole Location & Identification	Time	Current Primary Ground Ipg	Resistance Primary Ground Rpg	Calculated Voltage (primary neutral-to-earth) Vpne	Measured Voltage (primary neutral-to-earth) Vpne	
#			(mA)	(Ohm)	(V)	(V)	Notes
1							
2							

Note: If Vpne is measured it is not required to measure Ipg and Rpg for determination of the calculated Vpne. In cases where Vpne is calculated the following formula is used:

$$\text{Calculated Vpne} = (\text{Ipg} \times \text{Rpg}) / 1000$$

APPENDIX 4

TEST 4 – SECONDARY NEUTRAL VOLTAGE DROP TEST

Test Performed by:

Date:

Customer Name:

(All other farm loads must be off. Use only one load per circuit.)

	SITE:	1	2	3	4	5	
A	Site Location						Units
B	Circuit Neutral Wire Gauge						AWG
C	Circuit Neutral AL or CU						

D	Wire length (in 100's ft.)						100 ft.
E	Ω /100 ft.						Ω
F	Total Resistance (D times E)						Ω
G	Measured Neutral Current, Isn						A
H	Calculated Voltage Drop, VDropC (F times G)						V
I	Measured Voltage Drop, VDropM						V
J	Percent difference [(H-I)/H]* 100						%
	Vp load "off"						V
	Vs load "off"						V
	Vcc load "off"						V
	Icc load "off," if measured						
	Vp load "on"						V
	Vs load "on"						V
	Vcc load "on"						V
	Icc load "on," if measured						

**TEST 4 – SECONDARY NEUTRAL VOLTAGE DROP TEST
INSTRUCTIONS**

ITEM EXPLANATION

A-J Describe load site location, neutral wire gauge, neutral wire length (in 100s of feet), resistance per 100 feet (see table below), measured neutral current, measured voltage drop, Vp, Vs and Vcc or Icc for load "off" and load "on."

Voltage drop is measured from end-to-end of the secondary neutral being tested and the neutral bus of the building being tested. Electrical power to all buildings shall be turned-off during this test except at the building being tested. Locations of Vp, Vs and Vcc or Icc are the same as measured during the previous tests.

Calculate the total circuit resistance. Calculate using Ohm's Law, the expected neutral voltage drop. Calculate the absolute value of the difference and divide by the expected voltage drop. Express this as a percentage. If the two values (measured voltage drop and calculated voltage drop) do not agree, further investigation is warranted to discover the reason for the discrepancy.

Resistance Chart (ohm per 100 feet)

Multi-conductor Cables at 68 Degrees F.

MATERIAL		
GAUGE	AL	CU
14	0.423	0.257
12	0.265	0.162
10	0.166	0.102
8	0.104	0.064
6	0.066	0.040
4	0.042	0.025
2	0.026	0.016
1	0.021	0.013
1/0	0.016	0.010
2/0	0.013	0.008
3/0	0.010	0.007
4/0	0.008	0.005

APPENDIX 5
TEST 5 – LOAD BOX TEST

Date: _____

Time: _____

Dairy: _____

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
	FARM ON	FARM OFF	FARM OFF	FARM OFF	FARM ON
Condition	Load Box Off	Load Box Off	Load Box Half On	Load Box Full On	Load Box Full On
Time:					
Vp	V	V	V	V	V
Vs	V	V	V	V	V
Vps	V	V	V	V	V
Vcc	V	V	V	V	V
Icc	A	A	A	A	A

Load Box Current (Ilb):	Half Load	A	Full Load	A
Load Box Voltage (Vlb):	Half Load	V	Full Load	V
Primary Nominal Voltage Phase to Neutral (Vpri):		V		
Transformer Current Due to Load Box (IXFMR):	Half Load	A	Full Load	A

$$I_p = \frac{I_{lb} \times V_{lb}}{V_{pri}}$$

K-Factor for Cow Contact Point $K = \frac{V_{cc}}{V_s}$

TEST 5 - LOAD BOX TEST INSTRUCTIONS

Note 1: Testing may be accomplished by a single 18/25 kW load box or a dual element 9/18 or 12.5/25 kW load box. The difference between full load and half load measurements is used in most calculations.

Note 2: If the dairy is found in an isolated condition, two load box tests must be performed: an isolated test and a non-isolated test.

Note 3: If the dairy is served by a three-phase system, measure and record only the dairy-off, load box off column and the dairy-on, load box off column or test only one phase of the three.

ITEM EXPLANATION

#

- 1 Enter date and customer name.
- 2 Attach load box to the 240-volt secondary side of transformer. Turn on load box and measure current and voltage and record on data sheet, Appendix 5.
- 3 Conduct load box test and for each step measure and record Vp, Vs, Vps and Vcc or Icc. Each step shall be maintained for approximately two minutes with the highest reading during that time interval recorded.
 - Step 1 Farm power is "on" with load box "off"
 - Step 2 Farm power is "off" with load box "off"
 - Step 3 Farm power is "off" with load box "on" at half load
 - Step 4 Farm power is "off" with load box "on" at full load
 - Step 5 Farm power is "on" with load box "on" full load
- 4 Remove load box and restore normal power to the farm.

APPENDIX 6

TEST 6 – EQUIPMENT SIGNATURE TEST FORM

Dairy Name:

Date:

Location:

Descr. of Load	Location of Load	Load V	Load kW or HP	Load Phase 1 or 3	Load On						Load Off					
					Time	Vp	Vs	Vps	Vcc	Icc	Time	Vp	Vs	Vps	Vcc	Icc
1																
2																

**TEST 6 - EQUIPMENT SIGNATURE TEST FORM
INSTRUCTIONS**

ITEM INSTRUCTIONS

- 1 Enter the date the test is performed.
- 2 Enter the name of the dairy.
- 3 Enter the description of the load for which the signature will be recorded.
- 4 Provide a complete description of the load. Provide voltage, horsepower or kilowatt rating, if known.
- 5 Note the time of turn-on and the time of turn-off. Equipment should be “on” for a period of not less than 15 seconds. If equipment is found in the “on” condition, turn it “off” then turn it back “on.” If equipment cannot be manually cycled then record data at the next “on” – “off” cycle.
- 6 Repeat for all major circuits and pieces of equipment (both 120 volt and 240 volt). Some equipment may normally be operated in sequence. Start each piece of equipment at 15-second intervals until all are running, then turn off in reverse order at 15-second intervals.
- 7 If data is to be provided graphically, only load description and time are required to be provided on Test 6 data sheet. Operation of each piece of equipment shall be indicated on the graphical data sheet(s).

APPENDIX 7

PREVENTIVE ACTION LEVEL RESULTS

Enter the highest value of cow contact voltage or current that occurred during the 48-hour test from Appendix 2, and corresponding primary to reference ground voltage.

V_p48hr : _____ V V_{cc}48hr : _____ V or I_{cc} 48hr : _____ A

Enter the value of cow contact voltage or current and corresponding primary to reference ground voltage that was present during the load box test with the farm power off and the load box off.

V_p OFF : _____ V V_{cc} OFF : _____ V or I_{cc} OFF : _____ A

Enter the value of cow contact voltage or current and corresponding primary to reference ground voltage that was present during the load box test with the farm power off and the load box set at half load.

V_p HALF LOAD : _____ V V_{cc} HALF LOAD : _____ V or I_{cc} HALF LOAD : _____ A

Enter the value of cow contact voltage or current and corresponding primary to reference ground voltage that was present during the load box test with the farm power off and the load box at maximum.

V_p FULL LOAD : _____ V V_{cc} FULL LOAD : _____ V or I_{cc} FULL LOAD : _____ A

Calculations:

Utility Contribution to

$$\text{Cow Contact Voltage} = \frac{V_{p48hr} - V_{pHALF}}{V_{pFULL} - V_{pHALF}} \times (V_{ccFULL} - V_{ccHALF}) + V_{ccHALF}$$

Utility contribution to cow contact voltage = _____ V

Utility contribution to cow contact voltage as a percentage of V_{cc} 48hr = _____ %

Utility contribution to cow contact voltage as a percentage of PAL = _____ %

Utility Contribution to

$$\text{Cow Contact Current} = \frac{V_{p48hr} - V_{pHALF}}{V_{pFULL} - V_{pHALF}} \times (I_{ccFULL} - I_{ccHALF}) + I_{ccHALF}$$

Utility contribution to cow contact current = _____ mA (milliamps)

Utility contribution to cow contact current as a percentage of I_{cc} 48hr = _____ %

Utility contribution to cow contact current as a percentage of the PAL = _____ %

See Section 071.02 for required actions based on these results.

